



TO:	Corey York, P.L.S Acton Town Engineer/Director of Public Works	DATE:	October 2, 2015
FROM:	Joe SanClemente, P.E., AICP Alexandra Siu, P.E., PTOE	HSH PROJECT NO.:	2014113.00
SUBJECT:	Acton Center Traffic Study – Recommendations		

Introduction

Howard Stein Hudson (HSH) has prepared this memorandum summarizing existing transportation conditions and recommendations for proposed safety enhancements at the intersections of Route 27 (Main Street)/Newtown Road/Concord Road located within the Acton Center Historic District.

The Town previously commissioned a study of these intersections as part of the *Route 27 (Main Street) Corridor Study* completed in 2001. The study recommended modifications to the Main Street /Concord Road/Newtown Road intersection, including signalization. The 2013 Annual Town Meeting voted for funds to update and expand on the above study, with respect to the Main Street/Newtown Road/Concord Road intersections, to determine the most preferred alternative that preserves the historic character and while taking into consideration potential impacts on the nearby roads, intersections, and neighborhoods.

To date, the Acton Center Traffic Study has included the following efforts:

- An initial meeting with the Acton Historic District Commission on January 13, 2015;
- Meetings and coordination with Town of Acton Engineering staff;
- Review of prior studies, plans, and other documentation provided by the Town;
- Initial field observations and data collection in November 2014 and January 2015;
- First Public Forum on January 29, 2015 to discuss existing conditions;
- Development of design options;
- Second Public Forum on June 1, 2015 to recap existing conditions, present possible design options, and obtain initial feedback;
- Public comment; and
- Development of recommendations.

The following sections of this memorandum summarize the conditions, community input and involvement, and the proposed recommendations.



It is anticipated that the Acton Board of Selectmen at the conclusion of the study and receipt of further public input will recommend to the next Town Meeting to either fund the design and construction of the most favorable option(s) or select the option to make no changes.

Existing Conditions and Observations

HSH performed existing conditions field observations in November 2014 and January 2015. Vehicle, pedestrian, and bicycle count data was collected in November 2014. The resulting peak hours of traffic at the study area intersections were determined to occur from 7:45 – 8:45 a.m. and from 5:00 – 6:00 p.m. Automated traffic recorder (ATR) devices were utilized in order to obtain the traffic volume variations through the day and obtain vehicle travel speeds. Main Street, which is a categorized by MassDOT as an urban principal arterial, carries approximately 18,250 vehicles per day.

Comparison of count data from 2001, 2007, and 2014 at the intersection of Main Street/Newtown Road/Concord Road, indicates that traffic volumes have decreased by approximately 7% over the 13 year period and may be leveling off.

Travel Speed Data

The speed limit along Main Street within the study area is posted at 30 miles per hour (mph) in both directions and is consistent with the Special Speed Regulation. HSH noted that the speed limit along Main Street eastbound decreases from 35 mph to 30 mph approximately 150 feet west of Newtown Road.

Observations of travel speeds along Main Street indicate that the 85th percentile speed is 38 mph. Meanwhile, approximately 10% of vehicles were observed traveling at speeds of 40 to 50 mph, and some vehicles (<1%) are traveling at speeds in excess of 50 mph. A histogram displaying recorded travel speeds may be found in the attached presentation materials.

Circulation

Due to the acute angle of the intersections of Concord Road with Main Street, on each side of the Town Common, left-turns onto Main Street are prohibited at the eastern leg of Concord Road (opposite Town Hall) and right-turns are prohibited at the western leg of Concord Road (opposite Newtown Road). Because of the turn restrictions, motorists on Concord Road cannot directly access



Town Hall or the Library parking area via Woodbury Lane and must use either Nagog Hill Road or Newtown Road.

Sight Lines

Through field observations, it was determined that sight lines at the intersections of Main Street/Newtown Road/Concord Road are limited.

- At the eastern leg of Concord Road (opposite Town Hall), the location of the monuments to the left combined with the skewed angle of the roadway make it difficult for vehicles to see oncoming traffic from Main Street eastbound.
- At the western leg of Concord Road (opposite Newtown Road):
 - A utility pole at the southeast corner of the intersection limits sight distance east of the intersection.
 - Concord Road northbound intersects Main Street at an acute angle, making it difficult for these motorists to see over their right shoulder. The skewed geometry also results in confusion over whether motorists should use their directional when making a left-turn.
- At Newtown Road southbound, sight lines are limited to the west of the intersection due to the presence of trees and overgrown vegetation combined with the change in grade at the northwest corner of the intersection. At Woodbury Lane southbound, drivers looking to turn left onto Main Street must pull ahead of the stop bar to view on coming traffic. The view of drivers looking right are occasionally obscured by vehicles queued on Newtown Road.

Crash Data

HSH received detailed crash reports from 2009 – 2014 from the Acton Police Department. Most of the crashes observed were angle and rear-end collisions.

The data indicates that 33 crashes were reported at Main Street/Concord Road/Newtown Road during this time period. This corresponds to a crash rate of 0.736 crashes per million entering vehicles (MEV), which is higher than the District average of 0.66. Of the 33 crashes, 19 (or 58%) directly involved a vehicle entering the intersection from Concord Road northbound.

Only 8 crashes were reported at the intersection of Main Street/Woodbury Lane, which corresponds to a crash rate of just 0.20 and is well below the district average.



During this time period, no crashes were reported at the eastern leg of Concord Road at Route 27 or at Concord Road/Wood Lane.

The collision diagram illustrating the crash locations can be found in the attached presentation materials.

Community Input and Goals

Prior to performing any work on the project, HSH and the Town of Acton Engineering Department met with the Historic District Commission (HDC) on January 13, 2015 to initiate a discussion of traffic issues in the Acton Center Historic District. The HDC expressed a concern about potential changes that would be irreversible and have a dramatic effect on the historic character of the Town Common. The HDC emphasized a desire for low impact changes to the Common that would calm traffic.

The initial public forum was held on January 29, 2015 was attended by approximately 25 residents as well as several Town officials. The purpose of the meeting was to explain the overall study approach, present the initial existing safety observations, and obtain input from the community to help guide the proposed recommendations.

The main goals and/or concerns expressed by the community were:

- Need to slow high traffic speeds on Main Street;
- Residents currently seek alternate routes to avoid the Town Center;
- Intersection sight lines and confusing geometry make it difficult to determine gaps and who has the right-of-way;
- Unpredictable driver behavior make it hard to maneuver through the area;
- Desire to enhance walkability; and
- A majority of residents that attended the meeting opposed the potential for installing a traffic signal; although a few residents supported this idea.

Based on the feedback from the community and review of the existing traffic conditions, HSH developed four different preliminary design concepts aimed at addressing the main goals of slowing down traffic speeds, improving safety, and improving sight distance by implementing various geometric improvements and traffic calming measures.

At the second public forum held on June 1, 2015, HSH reviewed the existing traffic observations and presented four potential design options. The meeting was attended by approximately 66 community



members including the Town Engineer, members of the Historic District Commission (HDC), members of the Board of Selectmen (BOS), as well as members of the Economic Development Committee (EDC). Following a short presentation, attendees were invited to review the plans and discuss with HSH staff during a breakout session. The meeting was concluded with a review of community feedback, questions and answers, and discussion of the pros and cons of the various elements in each design option. A summary of the meeting and subsequent comments received via email are attached.

During the meeting a few of the attendees expressed their strong desire for a traffic signal at Main Street/Concord Road/Newtown Road. In general, the installation of a traffic signal must be evaluated against a series of warrants outlined in the *Manual on Uniform Traffic Control Devices (MUTCD)* to determine if a traffic signal **might** be justified. While the intersection of Main Street/Concord Road/Newtown Road does meet the minimum criteria for two of these signal warrants, during certain time periods of the day, the MUTCD indicates that “...consideration should be given to providing alternatives to traffic control signals even if one or more of the signal warrants has been satisfied.”

Given the potential negative affects to the Historic District that may result from the installation of a traffic signal (i.e., need for widening for dedicated turn lanes, traffic signal equipment, etc.) and the existing sight line and geometric deficiencies, HSH has recommended that a series of minor geometric improvements, circulation changes, and other traffic calming measures be initially considered.

Proposed Recommendations

HSH developed a final recommended concept plan that is a composite of the key elements that received the most positive feedback from the second public forum and subsequent comments (see **Figure 1**). The recommended concept was developed with an emphasis on improving safety and slowing speeds, while trying to minimize the impact on the historic character of the area. The key elements of the composite design and how they address project goals are discussed below.

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RAISED CROSSWALKS

Raised crosswalks are proposed on Main Street at the locations of the existing crosswalks to the east and west of Concord Road. Raised crosswalks operate as traffic calming measures by forcing drivers to slow down in order to ramp up to the pedestrian level and then back down to the roadway level. They also increase pedestrian safety by making the pedestrian more visible to approaching motorists. The Federal Highway Administration (FHWA) found that these treatments can slow vehicles speeds by 4 to 12 mph. It has also been found that raised crosswalk can increase the yielding percentage by up to 40%. Pedestrian warning signs, yield to pedestrian signs, and “Speed Hump” warning signage would be installed at both raised crosswalks to alert motorists. The design of the raised crossings would need careful consideration to minimize potential noise impacts. Consideration will also need to be given to the treatments used with respect to visibility, durability, and aesthetics.

SPEED FEEDBACK SIGN AND PAVEMENT MARKINGS

Chapter 90, Section 18 of the Massachusetts General Laws (MGL) requires posted speed limits to be established through the issuance of special speed regulations. Review of the 85th percentile speed data along Main Street indicates that shifting the current speed zone, and/or reducing the speed limit, is not possible since the prevailing travel speeds exceed the posted speed limit and would potentially result in an increase in the posted speed limit.

Therefore, HSH recommends measures to further emphasize the current 30 mph speed zone paired with targeted enforcement in an effort to slow vehicle speeds and improve overall safety at the intersections. HSH recommends replacing the existing speed signs along each direction of Main Street with radar speed feedback signs as a countermeasure to reducing speeds.

The sign is designed to display the vehicle speeds measured via radar and alert drivers of their travel speed versus the speed limit. To discourage “racing”, signs are typically programmed to not display speeds that are well in excess of the speed limit. FHWA has found these signs to successfully reduce travel speeds by approximately 5 to 8 mph.



Speed feedback sign. Source: FHWA

In road pavement markings indicating “30 mph” are also proposed along Main Street to further reinforce the speed limit signs for drivers approaching the Town Center. According to FHWA



studies have shown that these markings can reduce speeds by approximately 1 mph. These signs have the ability to collect volume and speed data that can help inform the Police Department when to most efficiently target enforcement efforts.

NARROWED TRAVEL LANES

Narrowing travel lanes helps to decrease a driver's comfort and therefore encourage slower travel speeds. Through travel lanes throughout the project will be decreased from approximately 14 feet in width to 11-foot lanes with right shoulders that range between 3.5 – 5 feet depending on the width of the roadway. According to FHWA, studies have shown that narrowed lanes and/or the addition of an edge line can potentially reduce travel speeds by 1 to 4 mph.

UTILITY POLE RELOCATION

During field observations, it was found that the utility pole at the southeast corner of the intersection of Route 27/Concord Road/Newtown Road obstructs drivers' view of oncoming traffic approaching from Main Street westbound. It is recommended that the utility pole be relocated to increase the sight distance at the intersection.

CONCORD ROAD ONE-WAY CONVERSION

Since approximately 58% of the crashes at the intersection of Main Street/Concord Road/Newtown Road involve Concord Road northbound motorists, it is recommended that the western leg of Concord Road be converted to one-way southbound from Main Street to Wood Lane. The roadway would also be realigned to facilitate left-turns from Main Street westbound. Converting Concord Road to one-way southbound would help to improve safety at the intersection with Newtown Road by reducing potential conflicts.

Meanwhile, the eastern leg of Concord Road would be converted to one-way northbound from Wood Lane to Main Street creating a one-way pair. The Concord Road northbound approach left and right-turn lanes will be channelized and separated by a traffic island. Each leg of Concord Road would be restriped to provide 11-foot travel lanes, 2-foot left shoulders, and 5-foot right shoulders.

REALIGN NEWTOWN ROAD

Newtown Road is proposed to be realigned approximately 40 feet to the east at the intersection with Main Street to enhance sight lines and to reduce the offset alignment with Newtown Road and Concord Road.

COMPLETE STREETS

To the maximum extent practical, all transportation infrastructure, and street design and construction projects that require funding or approval by the Town of Acton must adhere to the



Town of Acton Complete Streets Policy. As part of a future design process, further consideration and survey data will be needed to evaluate the overall feasibility and appropriateness of incorporating bicycle accommodations into the proposed design options and the potential impact on adjacent parcels within the Historic District.

Phasing of Proposed Improvements

The proposed improvements could be installed incrementally to allow for assessment of the individual effectiveness of the various enhancements. The proposed phasing scheme is shown in **Figure 2**, **Figure 3**, and **Figure 4** and discussed below.

PHASE 1

Phase 1 would include the following improvements:

- Enhanced pedestrian warning signage at the Main Street crosswalks to better alert motorists;
- Radar speed feedback signs on Main Street at the location of the existing posted speed limit signs;
- In-road speed limit pavement markings along each direction of Main Street;
- New edge lines along Route 27 to narrow the width of existing travel lanes; and
- Relocate utility pole at southeast corner of Route 27/Concord Road.

PHASE 2

Phase 2 will build off of the improvements proposed under Phase 1 and will include:

- Raised crosswalks and speed hump warning signs; and
- Enhanced crosswalk markings on Concord Road at the Acton Congregational Church.

PHASE 3

Phase 3 will build off of the improvements proposed under Phase 1 and 2 and will include:

- Realignment of Newtown Road;
- Realignment of Concord Road and conversion to one-way pair;
- Channelize Concord Road NB left and right turns onto Route 27;
- New edge lines and pavement markings along Concord Road; and
- Install pavers at Main Street/Concord Road intersections to tighten corner radii while accommodating truck access needs.



Figure 2. Phase 1 Improvements

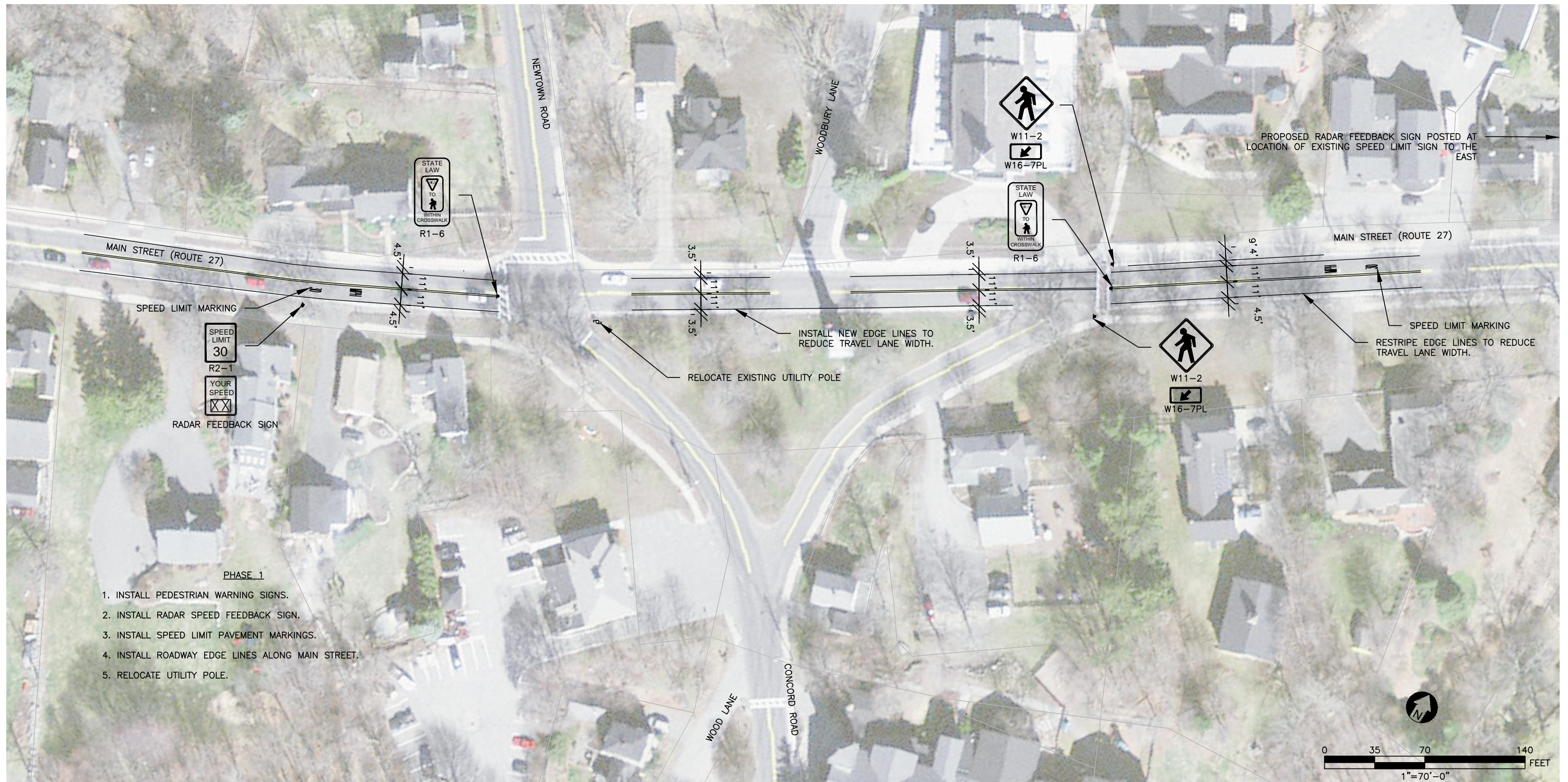
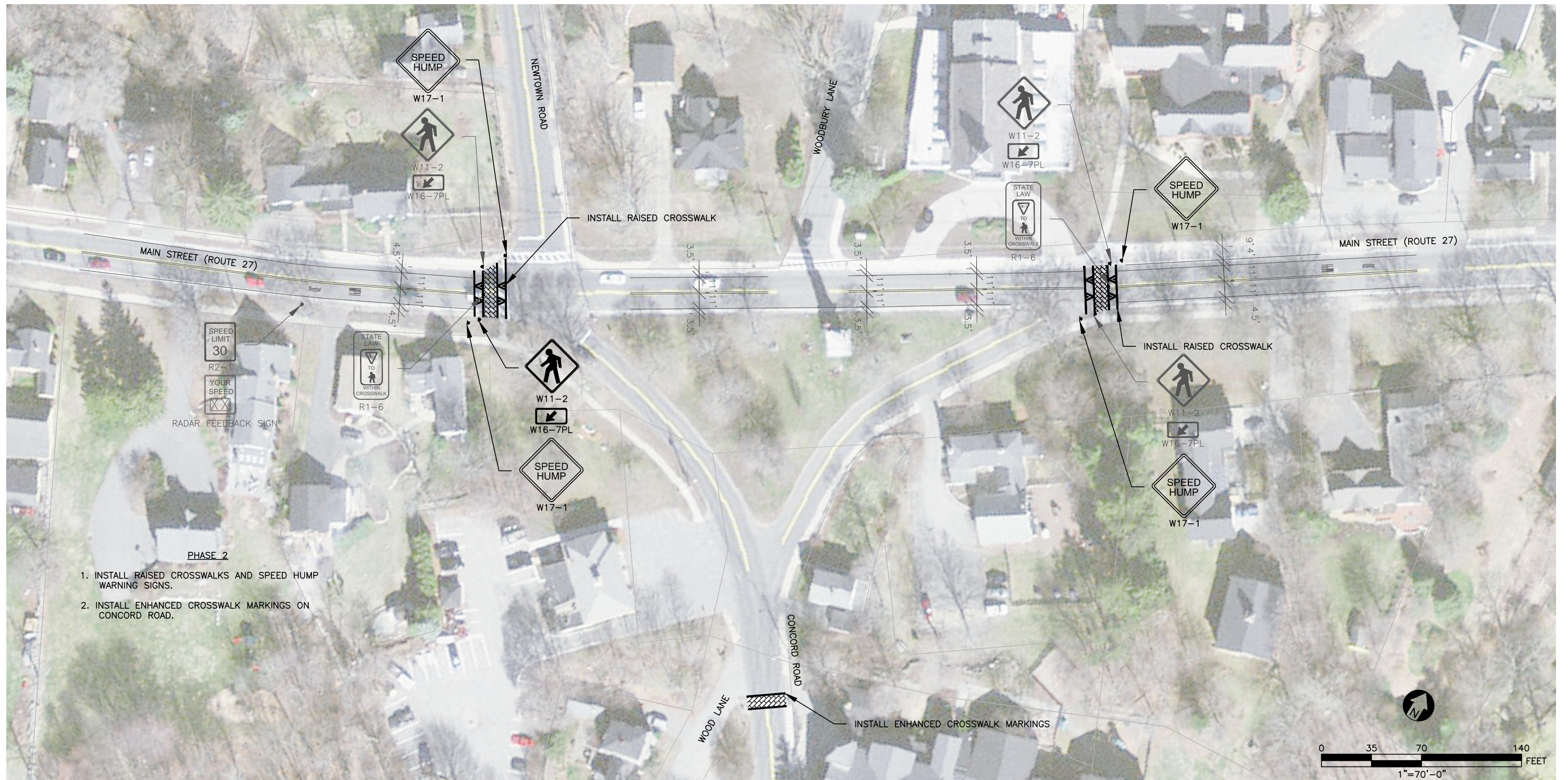


Figure 3. Phase 2 Improvements



PHASE 3

1. REALIGN NEWTOWN ROAD.
2. REALIGN CONCORD ROAD AND CONVERT TO ONE-WAY PAIR.
3. CREATE CHANNELIZED NORTHBOUND LEFT AND RIGHT TURNS FROM CONCORD ROAD ONTO MAIN STREET.
4. INSTALL NEW EDGE LINES AND PAVEMENT MARKINGS ALONG CONCORD ROAD.
5. INSTALL PAVERS TO TIGHTEN RADIUS WHILE ACCOMMODATING TRUCKS AT MAIN STREET AND CONCORD ROAD.



Future Considerations

Should the above improvements not be successful in significantly reducing the crash rate to an acceptable level (i.e., well below the District average), further consideration for the potential change in traffic control (e.g., signal or roundabout) may be warranted.

Attachments:

- Presentation slides from January 29, 2015 Public Information Meeting
- Meeting notes from January 29, 2015 Public Information Meeting
- Presentation slides from June 1, 2015 Public Information Meeting
- Meeting notes from June 1, 2015 Public Information Meeting
- Written Comments Received following the June 1, 2015 Public Information Meeting